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ABSTRACT

This paper uses a discussion of experiments with aphasics' use of verbally derived nouns to illustrate how one linguistic model may be superior to another in accounting for the facts of verbal behavior. The models involved are the transformational, which relates derived nominals to their source verb and lists only the verb in the lexicon, and the lexicalist, which lists both noun and verb together in the lexical entry. Subjects, sufferers from a type of aphasia in which the ability to use verbs is impaired to a greater extent than the ability to use nouns, were given a stimulus word (noun or verb) and asked to use the word in a sentence or explain its meaning. It was revealed that aphasics who have difficulty in using a verb can quite often produce the nominal derived from that verb with relative ease. The phenomenon was interpreted as suggesting that the lexical entry is coded in the brain in both its verbal and nominal forms and under the noun-facilitation circumstances, the nominal form is retrievable. It was felt that the lexicalist approach was able to reflect this phenomenon of brain function in a simple and elegant way, whereas the transformational model would be able to account for the phenomenon only by a complicated and implausible set of principles of brain function. (FWB)

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UNSOLICITED NOMINALIZATIONS BY APHASICS: THE PLAUSIBILITY OF THE LEXICALIST MODEL

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Verbal behavior studies often refer to variables which in part determine a subject's ability to perform a task. In addition to such factors as memory limitations, sentence complexity and associative strengths, one is familiar with such variables as the frequency of a word's occurrence in general language use and the length of a word or phrase. It is usually shown, for example, that short length and high frequency facilitate performance on verbal tasks. Linguists have not in general had much to say about such parameters of verbal behavior, since these do not figure in the specification of the grammar in any obvious way. Specifically, regardless of whether or not these are valid parameters of linguistic performance, it is not clear that our description of the grammar which underlies performance would be affected in any theoretically interesting way. In addition, however, some contemporary verbal behavior studies make explicit reference to such linguistic variables as phonological or semantic features, transformational rules and syntactic categories. Generally, data so obtained support the theoretical linguistic framework from which the experiment derived. On occasions when the data are somewhat anomalous, it is interesting to note that questions are raised concerning the appropriateness of the particular experimental methodology more often than the validity of the linguistic hypotheses underlying it. Being unable to find psychological evidence for a rule or feature is not in itself considered sufficient reason to warrant changing theoretical linguistic constructs. As in the previous case, such studies have had predictably little impact on linguistics. In most the grammar is assumed,

and the question is not whether the linguistic hypotheses are valid but whether they can be applied successfully as parameters of verbal behavior. Nevertheless, the status of the latter experimentation is different in that the variables in question are putatively both linguistically and behaviorally valid. Thus from the point of view of linguistics, the data from these studies is within the domain of linguistic theory; simply stated, linguistic hypotheses can and are being tested against verbal behavior evidence.[1]

It is encouraging to observe that, as verbal behavior theory incorporates more hypotheses about semantic, syntactic and phonological organization, linguistic theory itself is becoming rich enough to include alternative hypotheses for similar language phenomena. No one can seriously maintain that either approach has primacy over the other, for surely the goal is a model of language that accounts for what is in the human brain, both statically and dynamically. The remarks just made can be exemplified in a substantive way by considering the question of the organization of the lexicon, a question which in one form or another has been a major issue in most studies of language. In particular, we may consider one small part of the lexicon: the status of lexical items which may be realized as either a verb or as a derived nominal. Purely theoretical considerations lead to several possible models of how such words are related to each other; in current linguistic theory the most familiar ones are referred to as the transformationalist model and the lexicalist model.[2] Briefly, in the transformationalist model, only the source verb is listed in the lexicon (/destroy/, /protect/,...)

together with its idiosyncratic rule features. For example, destroy allows both agent post-posing and object pre-posing in the derived nominal form, just like passives; protect, however, allows only agent post-posing. Thus it is acceptable to note that,

(1) The microphone's destruction by Spiro annoyed the press.

but not acceptable in most dialects to note that,

(2) *The microphone's protection by the press annoyed Spiro.

In the transformationalist model the associated nominals, destruction and protection, are derived by transformational rule and thus are not listed in the lexicon.

In the lexicalist model, both the verb and its associated derived nominal are listed as a single lexical entry; what idiosyncratic syntactic and semantic properties each may have are noted under the appropriate grammatical category--noun or verb.

To the extent that the transformationalist and lexicalist models have been applied to the problems of derived nominals, it appears that either adequately accounts for the facts;[3] the issue is primarily whether the process of forming derived nominals is sufficiently like all other nominalizations to warrant a transformational derivation or whether the notable idiosyncrasies of derived nominals are more analogous to the general characteristics of the lexicon. In this case, one may legitimately ask which model is a more satisfactory account of verbal behavior. Given the theoretical adequacy of a model, there are three possible contingencies with respect to its empirical adequacy. First, it is possible that the model cannot in principle be a property of the structure or function of the human brain. Such a model would obviously be of little value regardless

of its putative linguistic elegance. Second, it is possible that a model could be a property of brain structure or function but isn't. Such a model would be unlikely or highly implausible because it would require a complicated set of rules or principles to relate it to brain structure or function. Although it may be the case that the relation between mind and brain is not one of identity but one of complicated, intricate and perhaps even inconsistent principles, there is no a priori reason to accept this view; hence the third, and optimal, possibility is that the model relates to or reflects brain function in a simple and elegant way. There is evidence to suggest that the transformational treatment of derived nominals is a model of the second type, requiring not only a complicated but also unwarranted set of assumptions in order to relate it to observed verbal behavior and that the lexicalist treatment is a model of the third type, requiring no additional assumptions in order to relate it to the same observed verbal behavior. The evidence comes from the performance of aphasic patients on some simple verbal tasks.

Aphasia, here defined as impaired adult language ability due to brain damage, is a rich and virtually untapped source of data about linguistic structure; its varied clinical forms display impairment of nearly every aspect of language use, often in a highly selective manner. Notice that if linguistic hypotheses are part of a language user's competence, and thus have valid psychological status as argued above, then it must follow that lesions in the central nervous system which disrupt the language ability will do so in a manner that is reflected by the model of the grammar.[4] Therefore, it is reasonable to ask whether aphasic's verbal

behavior provides evidence as to the nature of how derived nominals are processed or encoded in the brain.

By way of review, some recent observations by the Russian psychologists Luria and Tsvetkova and the British psychologists Marshall and Newcombe, bear directly on the problems of derived nominals. Luria and Tsvetkova (1968) discuss the syndrome "dynamic aphasia" in which a patient's ability to use nouns and verbs is differentially affected. They propose a simple test for dynamic aphasia: the patient is asked to name as many nouns as possible in one minute's time and then as many verbs as possible in the same time span. It is characteristic of patients with dynamic aphasia that as many as four times the number of nouns are named as verbs in this test. The facilitation of nouns in certain types of aphasia was also noticed by Marshall and Newcombe (1966), who studied a patient with specific reading disability--alexia. They found that wrong responses in a reading task tended to be nouns when the stimulus word was either a noun or a verb. 90% of the verbs misread were changed to nouns and 90% of the nouns misread remained nouns in the false responses. In this study only passing mention was given to noun responses for verbs in which the noun was the verb's derived nominal; when beg was misread as beggar and entertain misread as entertainment, Marshall and Newcombe referred to this as a "visual completion error." However, in a study presented to the Padua Conference on Psycholinguistics (July, 1969), Marshall, Newcombe and Marshall reconsidered the nominal responses in greater detail. Their interpretation of their data is sufficiently relevant to the present study to quote in full:

> The general pattern is quite clear and consistent across the two testing sessions. The subject finds it easier to read adjectives than verbs, but harder to read 'adjective nominals' than 'verb nominals'. There is a pronounced tendency to misread an 'adjective nominal' as its root adjective and to misread a root verb as its related nominal. Our earlier description of these errors as "visual completions' may thus be subject to certain linguistic qualifications.

Marshall, Newcombe and Marshall go on to imply that the more difficult adjectival nominals[5] may be transformationally derived and the much less difficult de-verbal derived nominals may, following Chomsky (1970), be lexically related to their source verb. They make no other remarks on the subject in the paper, and in particular make no reference to the alternative linguistic models for the treatment of derived nominals from verbs.

At the same time Marshall, Newcombe and Marshall were studying their patient, a series of patients were being studied at the VA hospital in Long Beach, California (Whitaker (1969)). Two of these patients, W.L. and K.T.[6], were sufficiently fluent that it was possible to administer a more difficult verbal task than the reading test employed by Marshall, Newcombe and Marshall. This task involved presenting the patient with a stimulus word and asking him to use the word in a sentence or to explain what the word meant. The test was originally designed to reveal possible semantic and syntactic errors which could then be specifically examined in other tests. At no time were the patient's errors remarked upon, nor were any grammatical paradigms taught. Furthermore, the test words were presented both orally and visually thus minimizing any potential defects associated with one of the language recognition modalities--reading or hearing. The third patient, F.W., was studied at Strong Memorial Hospital in Rochester, New York. His aphasia is severe and non-fluent and consequently the above

sentence-formulation test could not be administered. In this case, the stimulus words were printed on 3 x 5 cards and F.W. was asked to read them out loud, a test comparable to that of Marshall, Newcombe and Marshall. For all three patients, stimulus words were either nouns or verbs--adjectives and other grammatical classes were not employed. The data show only the errors made on verbs where the response was a nominal; most of the noun stimuli were either used correctly or not at all and approximately half the verb stimuli were used correctly or not at all. That is, errors on verb stimuli were either an 'I don't know' response or a nominalized response, since guessing was not encouraged. The stimulus word is given in parentheses; the full or relevant parts of the reply follows:

(3) Derived Nominals

K.T. (decide) Well, let's say that it's going to be a real decision...

W.L. (conceal) Concealment.

K.T. (obstruct) Well, the obstruction here...

K.T. (arrange) Arrangement? I'll have an arrangement with my mistress?

K.T. (engage) My engagement is just about finished.

F.W. (pray) Prayer![7]

F.W. (nominate) Nomination.

F.W. (collect) Collection.

F.W. (correct) Correction.

F.W. (portray) Portrait.

(4) Derived Nominals with Phonetic Errors

K.T. (reside) My residing is 1957 West Avenue, Forty-one.

K.T. (contain) Can I have my containment, please?[8]

K.T. (fill) I've got a fill, plate for my teeth.

F.W. (coerce) Corrosion.

(5) Nominals with Semantic Errors

K.T. (bathe) It's like a bath, usually wash myself my face and hands.

K.T. (speak) Debate...tomorrow's discussion.

K.T. (jump) They have things like shot put and pole vaulting...

F.W. (remember) Memory.

F.W. (sit) Retirement.[9]

F.W. (remove) Movement.

(6) Agentive Nominals

K.T. (admire) Your admirer, your tact.

K.T. (catch) Is that Catcher in the Rye? Wasn't there a book?

F.W. (destroy) Destroyer.

F.W. (speak) Speaker.

(7) Gerundive Nominals (some possible derived nominals)

W.L. (smile) I hate smiling.

K.T. (strike) Striking a match.

F.W. (eat) Eating.

F.W. (write) Writing.

F.W. (wear) Wearing.

F.W. (challenge) Challenging.

F.W. (hunt) Hunting.

K.T. (hunt) Hunt and deer, that's what I like to do.

F.W. (search) Searching.

F.W. (believe) Believing.

(8) Verb-Noun Homonyms

W.L. /riyŋ/ For instance, in an automobile you talk about a ring; I've been working with rings in an automobile.

K.T. /riyd/ What we would call the 'boonies', it's a weeds... something like grass or reed.

K.T. /siy/ Sea is in the ocean, usually it's a boat.

The above data is fairly straightforward, although it will be observed that some responses under (7) cannot be clearly interpreted. Striking a match is, of course, a gerundive; challenging could be the adjectival form and most of the other responses are ambiguously gerundive or derived nominals. Considering all the data, however, it is obvious that certain aphasics who have difficulty in using a verb can quite often produce the derived nominal associated with that verb with relative ease.

Some related evidence was obtained which is consistent with this assumption for the three patients. K.T. and W.L. were checked for their degree of facility in listing nouns and verbs, following Luria and Tsvetkova's test for dynamic aphasia. Both were able to produce a list of nouns in one minute's time--K.T. giving twelve different and W.L. eight different nouns. Some nouns of course were repeated and not counted. On the verbs, K.T. found it both more difficult to understand the instructions and harder to do the task itself, impressionistically measured by the frequency and duration of hesitations; K.T. produced four different verbs in one minute. It was not possible to induce W.L. to produce any verbs in this fashion, although he apparently understood the general outlines of the task since he was quite successful in producing nouns. Clearly both W.L. and K.T. have some degree of dynamic aphasia in the sense proposed by Luria and Tsvetkova.

The dynamic aphasia test could not be administered to F.W.; it was impossible to determine whether he could not comprehend the instructions or simply not do the task, since his spontaneous speech is drastically impaired. However, it was possible to obtain a sample of F.W.'s writing.[10] He was requested to write something about fishing; what he wrote is the following:

> The want in the water fish in a shell want in. Went a water in shell a water in fish. I want shell in the start an other in Govt in a care mother was his.
> shell
> care
> walleye
> Robert
> Bob's
> Canada

The lack of verbs is rather striking; want, went and was are the only three used and in the first instance, want is used as a noun. By contrast, eleven nouns and two pronouns were used. As a curious aside, F.W. did punctuate his "sentences" with capitals and periods as represented above, except for the final six nouns which were listed vertically.

One might profitably speculate on the strategies being employed by these patients in successfully doing the verbal tasks given them. The minimum strategy for either the reading task or the sentence-formulation task must be a simple lexical retrieval, which perforce would require identification of a syntactic category, an approximate semantic representation and an identification or matching of the phonetic shape. Particularly in the case of the sentence-formulation task, such a retrieval must be in the central language system since the stimuli words were presented both visually and auditorily. As would be expected, normal subjects do not alter the syntactic category in their responses, nor do all aphasics. However, in certain cases

of aphasic impairment nouns seem to be available to a significantly greater degree than verbs as the above data show. What is striking is that under such conditions verbs are generally nominalized, rather than being blocked altogether which one might reasonably have predicted. This phenomenon strongly suggests that the lexical entry is coded in the brain in both its verbal and nominal forms and under the noun-facilitation circumstances, the nominal form is retrievable.

It is important to note that there is no evidence whatsoever that any of the patients studied had normal control or command of such syntactic processes as question formation, negation, complementation or passivization. K.T. and W.L. in fact were specifically tested for many of these as reported in Whitaker (1969). F.W. could not be tested for such rules since he patently fails to produce even rudimentary sentence forms.

If we are to maintain that derived nominals are transformationally related to their source verbs, it is clear that such a model would account for the verbal behavior in question only by a complicated and rather suspect set of principles of brain function. In spite of serious impairments in the use of very general features and rules in the grammar, one would have to argue that these patients were able to make use of a transformational rule which, on good theoretical evidence, must keep track of highly idiosyncratic semantic and syntactic properties. It is even possible to imagine such a model requiring us to assume that brain damage adds functions rather than or in addition to impairing them, certainly an untenable consequence. If, on the other hand, we maintain that verbs and their associated derived nominals are both listed in the lexical entry or coded together, we have no additional linguistic or performance variables to account for except the

aphasic impairment itself that hierarchizes nouns and verbs in the process of lexical retrieval.

The suggestion being advanced is quite clear: other things being equal, it is possible to make use of performance data as criteria in choosing between theoretical models. The preferred model is always the one which fits the facts in the simplest fashion. A final word of caution should be mentioned. It is suspected that the brain achieves its remarkable integrative skills and cognitive capacities by parallel processing and redundancy--several brain structures may be capable of doing similar tasks when necessary. No evidence has been suggested which would rule out the possibility that derived nominals may be both transformationally derived and lexically related. What has been shown is that in certain circumstances the lexicalist model more adequately describes observed verbal behavior.

Notes

1. The field of psycholinguistics is quite extensive now and includes many different theoretical positions; a simple illustration of this is to consider the papers collected in L.A. Jakobovits and M.S. Miron (eds.) Readings in the Psychology of Language. Englewood Cliffs, 1967. A good introduction to psycholinguistics from the theoretical perspective most generally accepted by linguists is J. Deese Psycholinguistics. Boston,1970.

2. Detailed theoretical arguments may be found in Chomsky (1970), Lakoff (1965) and Stockwell,Schachter & Partee (1968).

3. This is somewhat of a simplification for there are problems with both positions. For example, Postal (1969) has shown good theoretical evidence that the pseudo-adjectives such as American should be transformationally derived in order to capture maximum generality. As noted by Chomsky (1970) however, the transformationalist model requires the postulation of non-occurring source verbs such as *auth for author. It does seem to be the case that either model is capable of accounting for the facts, although at present with various ad hoc devices. Chomsky suggested that the final solution may be a 'mixed' model; the curious data reported on below--that adjective nominals are somehow behaviorally different from verb nominals--does not conflict with his suggestion.

4. To some degree this is accepted by a number of researchers on aphasia; see for example, Blumstein (1968), Goodglass (1968), Reiff & Tikofsky (1968), and Weigl & Bierwisch (1968).

5. See note #3 above. This is clearly a puzzling area of aphasic verbal behavior which needs a great deal of study.

6. The clinical picture of the three patients studied in this research is interesting in its lack of similarities. Practically the only thing in common among the three is that the lesions were all in the left hemisphere. W.L. suffered a skull fracture and hematoma from a blow to the fronto-temporal region of the head. K.T. suffered a traumatic intracerebral hematoma in the parietal region from a bullet wound. F.W. suffered a generalized CVA from occlusion of the middle cerebral artery.

7. This stimulus word was printed underneath a line drawing of a group of people in church.

8. By his gestures and later reference to a 'thing to put worms in', K.T. obviously intended the word container.

9. This stimulus word was printed underneath a line drawing of a man sitting on a park bench.

10. Mrs. Virginia Goodwin of the Speech Clinic at Strong Memorial Hospital kindly made this writing sample available to me of her patient, F.W.

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